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Quantify grain growth from phase field modeling

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ABSTRACT

Grain growth and related dynamic behaviors have long been an interest for both fundamental science and engineering applications. One of the issues is to gage and measure grain growth in quantitative fashion that could go beyond the simple grain size dynamic scaling as shown in numerous models including those by von Neumann and Lifshitz, Slyozov and Wagner. In this discussion, I will present our recent study on quantification of grain growth from phase field modeling, which is the only case to date where the complete dynamic process is available for data acquisition (experiment is subject to limitations in both temporal and spatial resolutions). I will show how we could compute all geometric and topological properties of grains at different growth time. Connections will be made between our results and those from different theoretical models that represent different aspects of grain growth process, i.e., these from topological point of view, such as von Neumann model, and these from interface energy. If time permits, I will discuss the possible extension of this general approach in combination with mechanics calculations.